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IN LANDS WHERE DRUGS GROW.

By F. B. Kilmer.

Of the several papers which I have had the honor to read before this body, the present might be considered as the third in a series of observations taken in the lands which furnish market supplies of certain drugs.

On examining a pharmaceutical map, we observe that in nearly every region of the earth, whether habitable or waste, medicinal plants are found growing. While the vision of a Hanbury, a Flückiger, or a Maisch may sweep around the entire globe, the horizon of the ordinary worker extends but a little way.

Much work has been done by very able workers upon a few of the more prominent drugs. We possess the Pharmacographia of Flückiger and Hanbury, but with reference to the production and cultivation of, and the commerce in, drugs, the authors have admitted that their information is but fragmentary and of uncertain value. In these and similar works we find statements repeated and perpetuated for a generation with no attempt at correction, verification or addition. Often we find the text-books greatly at variance with the bills of lading as to the habitat of drugs.

In commerce it often occurs that the name of a country or province is attached to a drug, not so much to indicate the source as the variety. In respect to most drugs the real field of origin is a trade secret. For example: The entire result of a recent attempt to investigate the source of a certain vegetable drug was the information that it came from South America. Taken literally this

would mean that the plant might be found alike in the tropical, the torrid, the temperate, and possibly the frigid zone; indeed, that it could be gathered anywhere from the Gulf to Van Diemen's Land. For the lack of something better we often accept the shop label as authority, and reason out that all the root found in the drawer marked "Rheum Turk" comes from Turkey; that the senna comes from Egypt, and that "Spanish Flies" come from Spain.

At best we little know the story of the life and preparation of the plants comprised in our Materia Medica. The methods by which our drugs are cultivated, gathered or prepared for the market are for the most part beyond our observation. The importance of such knowledge must be apparent to every worker; the lack of it lamented by all.

During the manipulation of drugs, who has not wondered at the great differences of color, size, shape, texture, and in the yield and quality of extractive matter or active principles, the wide variability in physiological and chemical characteristics, and of therapeutic properties? The revelations of the lens and the reagent may start a train of thought running out to the fields, the hills and the forest, and lead on to speculation and inquiry concerning the operations in the living laboratory, and the changes which may have taken place in the shapeless fragments before him from first to last. Of all the questions that will thus suggest themselves, the greater number remain unanswered, and many at present seem unanswerable.

Recently I made a flying visit to those parts of England where, on a commercial scale, a limited number of medicinal plants are cultivated or are gathered in a wild condition. I also visited a portion of the Continent where the harvesting of certain drugs attains the rank of an industry. It is with regret that I admit the paucity of the information collected. The most that can be claimed is that in some instances the observations made by others are herein confirmed. A few errors are pointed out; a few new facts are presented; some of the problems involved are restated.

England seemed to me to be an ideal land for drug culture. A balmy, equable climate, a varied and fertile soil, a rural population of intelligent husbandmen holding the experience and traditions of many generations. In certain localities the culture of drugs has been successfully carried on for a hundred years or more.

It may be here noted that farming, as we know it in America,

does not obtain in the British Islands. Many of the formerly great estates are now at the best only poor dairy farms. Many of the ducal owners have entered the once despised trades; as one of them tersely expressed it, "farms now are poor-paying truck." Possibly some of these gentry, now so rich in land and titles, but poor in purse, might retrieve their depleted rent rolls by giving over a portion of their acres to growing drug plants. Altogether, it seemed to me that if any one country might attain supremacy in the drug-culture industry, it should be England. At the present time there are numbers of successful growers of strictly medicinal plants in the British Islands. The names of many of them are familiar to the American trade: Ransom & Sons, Hitchin; Peter Squire & Sons, Stafford Allen & Sons, Ampthill, Bedfordshire. In addition to these, there are several cultivators of small portions of land. Other medicinal plants have become naturalized and are collected from the wild or spontaneous growths; and thus drug-growing and gathering, taken altogether, is a considerable industry in the British Isles.

A number of economic problems are involved in this industry. At the prevailing prices the drug farming by itself would bring but poor returns. The English as well as the Continental drug culturists succeed largely by reason of other industries to which plant culture is an adjunct. In England it would be impossible to secure at a reasonable price laborers enough to harvest any large crop if the labor required for a few weeks were all that could be offered. The large growers, therefore, conduct laboratories where extracts are prepared and where oils are distilled. They are thus enabled to keep their laborers employed at all seasons of the year. English growers must meet Continental competition; prices and wages on the Continent are lower than in the British Isles, to the great advantage of the Continent in cost of production. In the more thickly settled portions of the Continent, however, wages are advancing, and this industry is being crowded more and more from the old centres, and mainly toward the East and North into regions where labor is still cheap.

On the Continent wild plants are gathered by a low grade of peasant labor, including women, children and aged or decrepit people, who are content to receive the lowest wages. Some drug gatherers earn as little as 10 pfennigs (2½ cents) per day. While

the constant tendency to secure cheaper labor for the industry keeps the prices down, it militates against any improvement in quality.

My limited observations tended to indicate that the available supply of many crude drugs is not on the increase. In England the area given over to drug cultivation could not nearly supply home consumption if no drugs were imported into the country. Reliable figures as to the acreage under cultivation could not be obtained. On the Continent, so far as I could learn, the cultivation zone is not extensive nor is it increasing.

In rural England the struggle for existence is very keen. The large drug farmer places every obstacle in the way of his smaller neighbor. He rigidly guards his methods of culture and preparation. The smaller man cannot find out what to grow or how to make it grow; the larger man controls the market, and takes good care that the "little fellow" makes no profit. Wild medicinal plants of certain kinds seem quite plentiful in the British Islands, but buying prices are kept down to a point where there is no inducement for the laborer to gather the product.

As an example we may take henbane. The leaves of the first year's growth in the English market bring 75 cents per pound; those of the second year bring $2.12 per pound. The supply is in the hands of a very limited number of growers. There are many small farms where the plant might be cultivated in areas ranging from a small patch to a few acres, but the small farmer lacks the requisite knowledge. Wild henbane seemed to me fairly plentiful, but in the vicinity where it is to be found labor is scarce, and there would be great difficulty for the small gatherer to find any market, except he should turn to his fortunate neighbor—the large producer—who controls both the inlet and the outlet.

Turning to the Continent, where drugs are gathered more largely from their natural habitat, we find that the annual yield of any given drug is not on the increase; good grades are always scarce; the supply is limited; and even an offer of extra price in most instances will not bring a better quality nor a much larger amount. In the evolution of "The New Germany," the regions where drugs were once gathered in quantity are now occupied by villages, factories and cultivated farms; the drug plants have been exterminated and the gatherer has "moved on."

The reasons for these conditions are various. Drug gathering is at present not like the cultivation of cotton, corn, wheat and food-stuffs, a settled industry; it is controlled by factors, small and large buyers, who seem to take good care to keep it within very narrow limits.[1] The main producer—the small peasant gatherer—is quite likely to be a very insignificant person who knows but little, whose desires are small, to whom a minute fraction of this world's goods brings content. If he or his family gather a hundredweight of drugs in a year he has only one market, and is satisfied to take whatever price may be offered him. These last observations do not altogether apply to such plants as yield essential oils, etc., or those which enter largely into other arts than medicine. Again, we may note some prominent exceptions in the case of certain very intelligent English and German producers, and of a few English chemists or German apothecaries who pursue this industry in a most painstaking manner in very remote and lonely regions.

We also see a ray of promise in the fact that in certain cities of the Continent there are being established sewage farms, on some of which medicinal-plant growing is in an experimental stage.

A visit to an English drug farm, or a stroll through the regions where the plants grow wild, is a delightful change from the smoky British city, and a wholesome relief from the pent-up shop and laboratory.

The roads, or rather the lanes, lead through woodlands, peaceful valleys, past quaint old ivy-covered stone houses, pretty commons and village greens. As we pass along peering over the hedges, white and red poppies appear; here and there a patch of lavender and mint; lactucarium almost everywhere. Under old hedges, at the stump of trees, especially in an abandoned chalk pit, belladonna grows luxurious and rank. In woods of almost impenetrable darkness, hyoscyamus, hellebore and atropa abound.

The man who will botanize on his mother's grave has been called a wretch, but drug plants seem to thrive best in the most sacred and historic spots of England. Given an abbey ruins, the remains of a Roman or other ancient fortress covered with the decay of

[1] An example somewhat notable is the recent "corner" in orris root, of which the zone of possible cultivation is very large. In the face of an apparently large crop, a few factors have been able to surround the entire source of supply, to send prices skyward and shut out all comers for some years to come.

many centuries, and, among the weeds rooted in the ivy-covered wall, bittersweet and belladonna are sure to appear. Around the castle grounds of King Cynewulf the gathering of wild hyoscyamus, atropa and hellebore is quite an industry. Over the remains of Richard Baxter there is a patch of elaterium, while Tom Tiddler's ground is a field of lavender.

Many of us, for the sake of health and content, might exchange places with the drug grower. His farm buildings and houses are substantial roomy stone structures. The head of the farm is "The Master," and inside his hedges is a petty lord.

The working forces consist of heavy-built, rugged, slow-witted and plodding men; of boys who are sometimes dull and stupid, but often lively in movement, and of fairly sharp girls with cheeks that need no cosmetics, and who seem to be the most industrious and effective workers. The hours are long, beginning at daybreak, which in summer occurs at 4 o'clock, and extending to the close of twilight, which occurs in England at about 9.30 P.M. Meals and refreshments are plentiful. Early breakfast; a 10 o'clock lunch served in the field; an elaborate dinner at 1 o'clock; tea at 4 o'clock; supper at bedtime, with rations of beer at stated intervals. Wages for good men run from 12 to 16 shillings per week. Girls and boys are paid less than half rates. All hands seem very contented, good-natured, well bred, and fairly well educated.

Drug farming as there conducted is not very different from any other branch of farming. The farms which I saw were remarkably well kept and tilled; every square foot of space was utilized.

The English farmer, as a rule, shuts his fields from view by a thick hedge or by a wall of solid mason work. The drug farms are especially well barricaded. Many of the fields are far back from the main roads, and the lanes are guarded with signs of "No Thoroughfare" or "No Trespassers."

Commonly speaking, only a portion of the whole farm is given over to medicinal plants, and it seemed to me that studious care was taken to avoid any surplus crops, just enough being raised to meet the natural demands. Thus, while there might be a short supply, rarely would the market be glutted.

The scenes presented on a drug farm are of peculiar interest to one whose province it is to labor with the products there gathered. Spread before our gaze are wild fields of the palm-like leaves of

rheum; acres of the stately, beautiful but deadly aconite; shocks of poppies that look like small babies' heads tied in bunches, while among the stalks run trailing vines of elaterium looking like squashes; scores of acres of belladonna; and, as far as the eye can reach, the sweet and beautiful lavender, the whole forming a scene which appeals strongly to the esthetic sense.

The crops are cultivated and gathered in a manner which to an American seems very primitive. Hoeing is usually done by hand. The fields are kept by the boys scrupulously free from weeds, stalks and stones. Stalks and branches are cut by sickles; the reapers are followed by the girls who glean and who carry the cut stalks in their aprons to the end of the field, there to be tied up in bundles or packed in bags and loaded on carts (to which, by the way, the horses are hitched tandem).

Thus, observing in the fields the cutting of the leafy stalks, the picking by the gleaner, the heaps of leaves wilting in the carts, and, following them to the drying house, one comprehends more fully and more clearly the many changes which follow in turn from the living structure to the finished drug ready for the market.

The changes viewed in the mass are striking and impressive; seen as it were through a kaleidoscope of pharmacognostic figures. The progressive transformations most apparent to our physical senses are the changes in color, in odor and taste. Thus, we observe that, dependent upon the conditions as to handling, leaves containing chlorophyl become spotted, darken and finally turn brown or black; while flowers lose their brightness, their hues change, disappear or turn dark. Somewhat equally striking are the changes of aroma occurring in many plants. Thus, the herbaceous narcotic drugs living in the field have no distinctive odor; but the moment they are torn from the living stem and during their manipulation the odor becomes heavy, disagreeable (to the novice positively nauseating). Again, the process of drying results in giving them the comparatively tolerable mousy odor, such as we find in hyoscyamus, belladonna, etc. Freshly-dug aconite has quite an agreeable, mild, radish-like odor. On the other hand, freshly-dug orris root has a strong repulsive smell, not in the least resembling violets, as one might expect. Lavender in the field is faintly suggestive of its name, but from the moment it is cut the odor augments until it fills the whole atmosphere. The development of

odor in plants during the drying and curing process yielding aromatic principles is well known. The evolution of the odorous principles, the hydrocarburets, aldehydes and ethers in the prolific laboratory of nature has been well studied and defined.

Again, the changes of taste are somewhat akin to the changes of odor. For example: Aconite fresh from the earth might be taken for wild horseradish root; but as the drying proceeds, it becomes the acrid drug which we know and dread. The first taste of many narcotic plants when quite fresh is not unlike that of any bitter weed; by chewing, the taste peculiar to the prepared drug is developed.

To the producer the most important change is that of color; and to this change the grower and gatherer devote much energy. The methods by which certain producers secure a color of uniform brightness are rigidly-guarded secrets. Courtesy forbade my asking information on this point of those most competent to give it, and my knowledge has been gained from personal observation and experiment.

Leaves, such as hyoscyamus, belladonna, etc., are usually gathered at a time when their chlorophyl content is at its highest, and when, as known by experience, they will dry with the least possible change. This course seems to be pursued irrespective of any other consideration, for the color of the finished product governs the price.

We may conclude with Dr. Squibb that a fine green color in leaves is not always indicative of the alkaloidal value of leaves. It has been hinted that in certain instances the producer has not hesitated to dexterously use prussian blue to bring up the required tint; I saw no evidence of this practice, however.

It is agreed that plants of which the leaves are the only objectives should not be cut under hot sunshine (but since hot sunshiny days are not plentiful in England, these crops can be gathered almost any day in the year).

After cutting, the leaves are removed from the sun, and care is taken that they are not allowed to lie in large heaps, or permitted to ferment or sweat. In the making of the so-called green extract, it is claimed that the process should begin at once.

While it is undoubtedly true that plants dried in the sun do not retain their color, one gatherer stated that the sun was the

only drying agent used by him. A smaller grower stated that he plucked the leaves from the stalk, laid them flat between porous paper, after the manner of preparing botanical specimens, and allowed them to dry while so pressed. He exhibited some very fine examples said to have been prepared by this method. And again, isolated growers dry the plants by the kitchen fire, thus producing fairly good-looking drugs.

The manufacturing of the extracts of fresh plants is not within the province of this paper. We may, however, note that by this process, when well conducted, the green color of the plant and its characteristic odor are well retained. It is stated that to obtain this color it is necessary to bring the plant juice quickly to an elevated temperature, whereby the ferment principle—the cause of the change of color—is destroyed.

For drying the leaves the most common method observed was by means of what might be called drying closets. These are fitted up with trays, the bottoms of which are of wire, or in some instances cloth. These closets are usually heated by hot air, but in the larger establishments are fitted up with steam pipes; along the bottom or sides of the closet provision is made for the inlet of cold air, and for the exit of warm air at the top.

So far as I could judge it seemed the general practice in the case of plants like belladonna, hyoscyamus, digitalis, etc., to pick the leaves from the stem (from hyoscyamus the midrib is removed), then to lay them flat and rather loosely upon a tray, and place the tray in the drier. The temperature was then run quickly up to 160°-180° (sometimes higher). As soon as the leaves were well heated through, the trays were either removed to another compartment where the temperature was lower, or else the heat was shut off, the real drying being continued at a moderate temperature, accompanied by a careful turning of the leaves as the process went on. In one drying apparatus I noticed that round baskets of cloth and wire were used instead of trays. It will be observed that the primary object in such processes is to preserve the natural color of the plant, and, of course, incidentally to prevent decay.

I became satisfied that this course is pursued in most instances without any other consideration; many of the growers, having found that a given method will produce the desired color, follow the pro-

cedure rigidly, and under no consideration could they be induced to experiment or change.

It seemed to me that to suddenly subject a fresh plant structure containing alkaloidal principles—glucosides, ether, resins, and other delicate and complex substances—to such a high temperature in the presence of so much water (comprising the natural juices) amounted to a cooking process which must result in radical if not injurious changes.

It is well known that the cause of the change of chlorophyl is due to the presence of oxydases, or oxidizing ferments which are in the cells of the fresh plant. When the plant is torn from its structure, bruised and exposed to light and air, the ferment action is started; and this is well known to be followed by destruction of chlorophyl in many plants. To avoid this the crude but effective method of heating the plant to a point destructive of the oxydase is used. If a green color is a necessity, experiments might be conducted to ascertain whether it might not be preserved by using some agent other than heat, and without injury to the other constituents. It has been suggested that the vapors of formaldehyde act as a preservative for plant colors. I am endeavoring to have experiments made with this agent on a practical scale. It is, however, quite possible that the action of the formaldehyde will bring about other and undesirable changes in the albuminoid constituents of the plant. I have also suggested experiments looking towards the drying of these plants under red or amber glass, accompanied with a moderate amount of heat.

With respect to roots the color problem is presented in a different aspect. It is not desired to preserve the natural color of roots; the general tendency of the resinous matters often present in the root is to become darker; this is not checked, and as to drugs like aconite, etc., the darker the color, the better will be the market price, as a rule.

After digging, the roots are usually washed, an operation very carelessly performed by the lower class of gatherers. The root must, therefore, be washed several times before reaching the ultimate market. To avoid the tendency of thick, fleshy roots to become mouldy, and to facilitate drying, they are split lengthwise or laterally, according to the nature of the root, or in obedience to custom. The workers in this industry have solved the problem of

drying roots in their own way. Many special processes, the product of which brings high prices, are held as secrets. Uniformity of color seems to be a general object. In certain cases this is brought about by a combined process of sweating and drying. The fresh material is covered and placed in a moderately warm place for a longer or shorter period, until the desired color is developed, and is then dried. As a rule, the more quickly the drying is accomplished, the lighter will be the color. The intelligent producer has also learned that at certain stages of growth the root or leaf is more likely to yield the desired color. Another requisite is that, at the time of gathering roots, the content of resin, starch or inulin should be at its fulness. It has been found that at such a time, the cells being well filled and the product more firm, the result will be a weight increased in proportion to bulk.

Many drugs, more especially roots, when received by the large buyer from the growing district, are unmarketable; probably they have not been well washed; or they have been carelessly dried, and, when looked at in heaps, they present a motley array of colors, sizes and shapes. It is the province of the dealer to put them into a merchantable condition. Then begins a series of washings, soakings in water, splitting, cutting and drying, a general dressing up, until the whole lot is brought to a somewhat uniform outward appearance. I am not prepared to say whether or not in such manipulation foreign substances are sometimes added.

In the course of my observations, seeing here a heap of light-colored root which ought to be dark, and there a heap of dark-colored root which ought to be light; here a mixture of muddy reds and browns that should have been bright and clear; noting in close proximity a mixture of chalks and solutions of various-colored dyes, I could imagine how easily a change of color might be brought about with the means so close at hand. How much or how little the toning processes which I have described affect the important constituents of the drugs is an unanswered problem.

Dieterich has treated the question of chemical changes which take place in the drying of many drugs in a most painstaking manner. Among the important transformations which he enumerates is the oxidation of tannic acid into phlobaphenes. This, as he shows, is strikingly illustrated in malefern and rhamnus, and also in cinchona, cinnamon, frangula, and indeed in all barks; there is also the devel-

opment of benzol, benzaldehyde, benzoic acid, and styrol in benzoin; the formation of ferulic acid in asafetida; and in all resinous drugs complex and varied reactions take place during their preparation for sale and use. The same author cites the well-known and most profitable examples of such action as exhibited in vanilla, indigo, litmus, etc., wherein the principles sought are resultants of what is termed a curing process "the work of man."

In watching the handling of drugs in the field, and in the study of their growth, a series of changes becomes quite apparent to the senses, and is easily demonstrated by experiment. As the plant is broken into parts, striking changes occur as the minutes go by; oxidation follows with incalculable rapidity; starch and inulin change to or toward sugar; the sugars in turn are transformed; the juices jellify; fats are broken up; proteids are dissolved; glucosides are resolved into sugar, aromatics and pigments.

These phenomena present important problems which have been but little studied. We know that the living plant structure is the seat of a multitude of chemical changes; that is, has been built up by successive or alternating chemical actions and reactions. As the life force departs, a series of changes begins in the plant cell that is even more complex than those of the living tissues.

Many of the changes here mentioned as observable in the plant cells during the preparation for use have been erroneously attributed to the action of the "plant acids," or obscurely explained by the use of the indefinite term "oxidation." The key to the transformations in the dead cells lies in the action of the ferments and the bacteria. When a plant is uprooted from the soil; when the stalk is severed from the root; when the branch is cut from the stalk; or the leaf is torn from the stem, there is a change of conditions and of environment that is the beginning of the end of organic existence. It dies as the animal body would die if the head were severed from the body, only more slowly, more in detail and unconsciously. The organs and functions of plant life fade away; it wilts; nutrition ceases; the secretions dry up; capillary circulation is checked; the living thing dies. Accompanying this phenomenon of death is a series of changes more rapid and more nearly akin to those which follow the departure of animal life. Micro-organisms within the plant tissue and of the air are loosed from restraint; the changes in the plant protoplasm afford a nutritive pabulum, and the

organisms grow with fearful rapidity and produce marvellous transformations. A dismembered plant left to the uncontrolled action of bacteria would soon rot and mould out of existence. But greater than all is the action of the ferments. Secreted by the plant cell, they are called into their highest state of activity by the dismemberment of the plant. The change in the juice of the dying plant furnishes the favoring media. With the inlet of oxygen they spring from a dormant state to become an incalculable force.

The presence and action of these oxidizing ferments in vegetable juices is easily demonstrated. We have simply to cut an apple, pear, carrot, and note the rapid browning of the juice. The same action will take place in many medicinal plants, probably in all containing glucosides, chromogen, and tannic compounds. In aconite, belladonna and hyoscyamus the action is observable to the eye. If the juice of these plants is extracted, boiled and filtered, the extract will have the beautiful green color of the chlorophyl which will remain. If we omit the boiling, the juice will darken, turn muddy, and the green color will finally disappear. These changes are observable even when care is taken to exclude bacteria, as by conducting the examination under cover, by filtering juices through porcelain or using antiseptics. Farther, if we add to the boiled juice a portion of the fresh unboiled extract, we find that the same change of color follows. If we extract the plant with a menstruum of glycerine and water (adding enough chloroform to prevent change), and then add to the extract an excess of alcohol, we obtain a precipitate which, on redissolving in water, will be found to be the cause of the change; in other words, the precipitate carries the oxidizing ferment.

By similar methods we may demonstrate the presence and action of diastase and inulose; the gum ferment, and the cellulose-dissolving enzymes; pectose, a jelly forming ferment; glucoside-splitting enzymes, as shown in myrosin, from mustard; rhamnose, etc. To these agents we may add the host of bacterial forces present in the plant, in the air, and invading the dead plant from every side.

My own observations, while exceedingly crude, are recorded in the hope of stimulating further study by more able workers. I have made attempts to examine and compare the extractive from certain plants while in the green state, and from the same plants dried, and

prepared under varying conditions. I have also attempted to observe and record the structural changes that may take place during the manipulations for the market by examining and comparing the cellular constituents of a specimen freshly cut from a growing plant with those of a specimen of the same plant dried under different conditions.

I can state that there are observable differences; their importance or meaning I will not attempt to interpret. Those who manipulate the same drug repeatedly know that great variations are found in different lots as regards facility of extraction, consistency of extract and other physical characteristics. Manufacturing laboratories will oftentimes make purchases only after a trial of a large sample as to "workable properties;" that is to say, the character of the extractive, the condition of the alkaloids, the ease of separation may count for as much or more than the sum of alkaloidal constituents. These workable properties at least seem to me capable of being controlled by the methods of preparation followed in the field.

The variations in vegetable drugs arising from differences of soil and climate, and of methods of cultivation, likewise certain observed facts touching specified plants, must be left for further study. I desire, however, to call attention to the recorded observations as to the differences as to physiological action between the undried and the dried plant.

NOTE.—As to the belladonna plant. I have records of cases of poisoning by the green plant, taken by competent observers at the place of growth, which clearly show marked differences of action as compared with the recorded effects of the dried plant. These differences in physiological action are possibly traceable in a measure to causes which I have here noted. Incidentally, these conditions emphasize the necessity for standardization, and at the same time reveal some of the difficulties in the way of realizing it.

My observations tend to show that at the present time we seem dependent upon haphazard sources for a large part of our supplies of crude drugs; that the commercial value, physiological action and therapeutic value of a drug may depend quite largely upon the man who removes it from the soil; that in drug culture "the man with the hoe" and the man with the sickle are quite as important as the man behind the percolator, each in a measure holding the life of the patient and the success of the physician in their hands.

So far, only in the case of plants for which a large industrial demand exists has scientific attention been given to the source of supply. Where such attention has been given, as in the case of drugs which produce essential oils and of cinchona, vanilla, indigo, etc., the advantages of intelligent systems as compared with haphazard methods in the preparation of crude material have been strikingly demonstrated. The drugs which have received little or no attention along these lines, if taken collectively, would involve a large money value. Any drug that is of sufficient importance to be engrafted into the Pharmacopœia or to be used as a life-saving agent, is worthy of study in its every aspect.

The agriculturist is more and more becoming master of the vegetable kingdom. Scientific agriculture has taught the grower how he may develop given products of plant-life forces. He can control the production of leaf, root, stalk or seed; can increase the amount or change the character of starch, sugar or other compounds; he is, in fact, master of the specific functions of his plant.

If so much can be accomplished with rye, oats, wheat, corn and potatoes, why can we not similarly treat jalap, ipecac and a hundred other drugs, and gain control of their extractives, their glucosidal and alkaloidal constituents?

It would seem to me that the extension of the study which has been so beneficial to a few of our medicinal plants would serve for the betterment of all of our vegetable materia medica.

I therefore recommend extended studies of the most useful medicinal plants, both in their natural habitats and under cultivation, having in view to ascertain the metabolic processes which enhance or decrease medicinal values;

Also studies of the changes which take place in the processes now employed in the preparation of medicinal plants for the market, especially of those containing potent, active principles, such as glucosides, alkaloids, etc.;

The publication of specific information as to the propagation, cultivation, collection and preparation of medicinal plants, with a view to the highest conservation of their medicinal constituents, and of securing more uniform production;

The publication by the Government of statistical and specific information as to the sources of leading vegetable drugs (especially such as are imported), with information as to the methods of preparation and commerce;

The issuance by the Government of bulletins of information as to the best modes of cultivating, collecting and preparing such medicinal plants as are suited to the climates of our States and colonies.

MICROSCOPIC STUDY OF URINE, SPUTUM AND BLOOD.

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It shall be the object of the writer, in presenting this paper, to deal only with such methods as have, after thorough trial, proven wholly satisfactory, and to give that which is absolutely necessary for the performance of this work.

It is fairly easy to make good permanent mounts of all forms of crystals and amorphous substances, as well as bacteria and fungi found in urine; but when we desire to preserve casts, blood, pus and epithelia the work becomes more complex; yet equally satisfactory results are obtained. It is an invariable rule that better specimens can be prepared from urine after it has been allowed to stand in a cool place, while a precipitate collects at the bottom of the fluid, than where we sediment by means of the centrifuge. Decant urine and add an equal amount of water to the precipitate. Set aside in a cool place, while precipitate again forms. A portion of this sediment is lifted by means of a pipette, and a small drop is placed on the centre of a slide and gently spread by means of a fine needle. It is now viewed under a low power to determine the specimen's value. (1) It can be evaporated to dryness and mounted in Canada balsam. (2) The water may be absorbed by small pieces of filter paper, touching such portions of the urine as contain little sediment, leaving behind both organic and inorganic materials which are yet moist from the small amount of urine that remains.

In the study of fungi, epithelia, bacteria and fat, the slide is dried after the manner of (1) and heated over a flame sufficient to fix the specimen to the slide. A drop of carbol fuchsin is placed on the specimen and allowed to remain one-half minute, when it is removed by allowing a feeble current of water to flow on one end of the slide

and to flood the specimen. When all stain is removed it is well to add a weak solution of methyl blue for one-half minute and remove the stain as above. The specimen is now dried in the air, when a drop of balsam is added to its centre and a cover-glass is gently placed on this balsam, which it spreads by its weight. Where the process of drying is after the manner of (2), both organic and inorganic substances remain unchanged, and it was with a view to the preservation of all sediments found in urine that I recommended the following mounting medium:[1] Liquor acidi arsenosi (U.S.P.), 1 fluid ounce; salicylic acid, ½ grain; glycerin, 2 fluid drachms. Warm slightly until solution is affected, when add acacia (whole tears), and again warm until solution is saturated; after subsidence, decant clear supernatant liquid. A drop of formalin (40 per cent.) may be added to this mixture if desired. By means of a glass rod a drop of this medium is placed on the centre of the specimen, when it will be seen that the remaining urine surrounds the medium, and to effect an equal distribution of the substances mounted, a fine needle is carried from the outer margin of the urine to the centre of the medium until the two show no tendency to separate. A cover-glass is moistened by the breath and allowed to fall gently upon the medium, which is spread by its own weight. Slides thus prepared should be kept in a cool place on a perfectly level surface for at least twenty-four hours, after which time they can be rung with any form of microscopic cement. No stain can be used where specimens are mounted in this medium. A peculiarity of this medium is that, on the application of heat or agitation, it becomes filled with small air bubbles. This was at first thought a possible objection, but I find specimens mounted January, 1897, containing many bubbles, show every characteristic presented by the same urine studied after the usual method employed.

The study of sputum is best conducted by pouring the sputum on a clear piece of glass and selecting for examination the small masses, if any are present. This mass is placed between two cover-glasses or slides and compressed firmly, after which the glasses are separated by a sliding movement and allowed to dry in the air. When perfectly dry, pass three times through the flame and then add a

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[1] *New York Med. Journal*, November 4, 1899.

few drops of Sterling's stain[1] to the specimen and steam over a flame for from one to two minutes; remove this stain by washing in water and then add a few drops of a 30 per cent. solution of nitric acid. Continue the acid until the specimen has apparently given up all its blue color; wash in water and add saturated alcoholic solution of Bismarck brown for one-half minute. Again wash and dry between layers of filter paper. The specimen can now be mounted in Canada balsam, and when studied under the 1–12 (oil immersion) lens the tubercle bacillus is stained violet, while all other organisms and cellular elements are stained brown. My reasons for using this stain are: (1) You are never dependent upon an uncertain quantity, Gabbett's acid blue solution. (2) Bacteria, commonly met with in sputum, are better stained by Bismarck brown than by acid blue. (3) It is easier for the untrained eye to detect a violet bacillus on a brown surface than to detect the same organism stained red when surrounded by an indefinite blue. The study of pus is not dissimilar to that of sputum; however, it is well to stain several specimens, one of which should be with the view of detecting the tubercle bacillus and one by Gram's method.

The preparation of cover-glasses and slides is all-important in the study of blood. Cover-glasses on coming from the factory are usually covered with a fine film of dust, which is best removed by washing them with soap and water, taking each glass between the thumb and finger and rubbing with a soft handkerchief until it is clean, when it can be dried with another handkerchief and dropped into a perfectly clean, wide-mouthed bottle, which is carefully corked. Treating these glasses with strong mineral acids often fixes the dust to the glass and makes it troublesome, if not impossible to remove. I see no advantage in keeping clean covers or slides in a mixture of alcohol and ether.

In preparing to examine the blood of a patient, it is well to place a piece of filter paper in the bottom of a Petri dish and to remove from the bottle as many covers and slides, by means of

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[1] ℞ Gentian violet, 10 grammes
Anilin oil, 4 "
Alcohol (95 per cent.), 20 "
Aqua Dest., 176 c.c.

Add the anilin oil to the alcohol and dissolve gentian violet in water. Add solution of gentian violet gradually, shaking between each addition; filter.

clean forceps, as are to be used; arrange them on the filter paper in such a manner that they can be lifted out readily with the forceps. The cover is now placed on the dish and it is heated moderately. Blood spreads much more readily where the cover-glasses are warm.

The lobe of the ear is washed with alcohol or ether, and after drying a slight puncture is made. The first drop of blood is wiped away with sterile gauze; the summit of the second drop is touched by the centre of a cover-glass, which is so held between the thumb and finger as not to touch its plane surface. This cover is allowed to fall gently on another in such a manner that its margin protrudes at some point, when the blood will be seen to spread between the adjacent surfaces of the covers; the projecting edges of the covers are grasped, and they are separated by pulling on the horizontal, when they are returned to the Petri dish, specimen surface up. The ear should be dried with the gauze after each specimen is taken. Where it is desired to study the blood in its fresh state for the malarial plasmodium or other parasites, the drop of blood is taken as above and the cover is allowed to spread on a slide. If it is desired that the parasite be kept living for some time, a ring of oil two-thirds the diameter of the cover-glass is made on the centre of the slide, and this ring must be broken at one or more places. The cover-glass is so placed on this ring as to bring the drop of blood in its centre, when it will be seen that the spreading of the blood will force the oil to the margin of the cover, all air having escaped through the opening in the ring which is now sealed. Blood thus prepared shows no tendency to clot, and its corpuscles are well preserved; if kept in a warm place parasites live for an indefinite time, the writer having kept the filaria sanguinis hominis living for ten days after this method. When studying the blood in its fresh state for malaria the first method is quite satisfactory, if the blood be collected during or near the time of a paroxysm (chill). Under a 1–12 oil immersion, the malarial parasite appears as a small hyalin body usually situated in the blood corpuscle and containing one or more granules of pigment, which are seen to be in constant vibration (Browning movement). This organism may be circular, pear-shaped or crescentric; and, in fact, there are so many varieties, that the reader is referred to "Anders' Practice of Medicine,"

pages 80 to 81, where a collection of plates of this organism is given.

Of all the methods given for the fixing of blood specimens, none other is so satisfactory as heat; as it not only fixes the specimen to the cover-glass, but favors its reaction to stains and preserves the form of the corpuscle. Fixing by heat is best accomplished in the following manner: A bar of copper 15 x 3 x $\frac{3}{16}$ inches is placed on a tripod, and thoroughly heated by a flame which is placed under one end. The temperature of the bar is determined by dropping water on its surface, and the point at which the water boils is where we place our cover-slips, specimen down, and allow them to heat for twenty minutes. Specimens thus fixed can be studied at any future date.

Staining is best effected by the Ehrlich tricolor mixture, which is prepared as follows: Saturated watery solution of orange G., 6 c.c. Saturated watery solution acid fuchsin, 4 c.c. To these add, a few drops at a time, and shake well between each addition—saturated watery solution of methyl green, 6·6 c.c. Then add glycerin, 5 c.c. Alcohol abs., 10 c.c. Water, 15 c.c. Shake well for a few minutes and let stand for twenty-four hours; do not filter or pour stain from the bottle, as disturbing the sediment is destructive to the stain. A cover-slip is now placed in the forceps and a few drops of the above mixture is placed on the specimen, by means of a dropper, and allowed to stain for two or three minutes, when it is washed in water, dried and mounted. The advantage in using this stain is, that you can rarely overstain the specimen, and it demonstrates clearly every characteristic presented by the different cells found in both health and disease. In studying the blood for parasites, very satisfactory results are obtained by staining by 1 per cent. of eosin in 70 per cent. alcohol, for one minute. Wash in water and stain with Delafield's hæmatoxylon, one minute; or with a solution of methyl blue, one-half minute. The specimen is then dried and mounted.

Estimation of the number of red and white blood cells, hæmoglobin and differential counting form sufficient basis in themselves for a paper, and have, therefore, not been considered in this article.

COMMERCIAL CALCIUM LACTOPHOSPHATE has been shown by T. S. Barrie (*Pharm. Jour.*, 1900, p. 228) to contain 35·8 to 44·8 per cent. of free lactic acid; 12·3 to 15·1 per cent. of calcium phosphate, and 41·0 to 49·9 per cent. of calcium lactate.

EFFERVESCING CITRATE OF MAGNESIUM.

By Wilbur L. Scoville.

It is frequently reported in pharmaceutical literature that magnesium sulphate is found in solution of magnesium citrate as an adulterant, but rarely does any one call attention to the almost universal existence of magnesium sulphate in the so-called granular effervescent citrate of magnesium. Yet true citrate of magnesium is seldom obtained, at least in New England, under this title. Nearly all of the so-called granular effervescent citrate of magnesium consists of an effervescent sulphate of magnesium or of sodium. The United States Pharmacopœia has embalmed the title and kept it before the profession, but the preparation itself has been defunct for more than a decade. It is time that the corpse were buried and the thing called by its right name. So long as the Pharmacopœia holds this title, it will appear as an alias upon the label of ambiguous preparations, and variable will be its forms. The true article *can* be secured by dint of hard emphasis in an order, a willingness to delay and to remunerate accordingly, and an assertion that the purchaser knows what he wants and will insist upon having that and naught else, but in the ordinary channels of trade, and ordered in the usual manner, another article will be sent, in the writer's opinion, every time.

The objections to the official preparation are threefold: (1) it is not as nice appearing a preparation as its substitutes; (2) it costs several times as much, and (3) it is a difficult and tedious preparation to make.

As to its action, Dr. H. A. Hare says: "Citrate of magnesium is a much more irritating purge than the sulphate," but the question of therapeutics I will not attempt to consider.

Probably the greatest obstacles to its practical employment are its cost and the difficulties of making it. In its manufacture, acid citrate of magnesium is first formed by reacting upon magnesium carbonate with citric acid.

In this reaction sixteen molecules of water contained in the magnesium carbonate and the citric acid are liberated, and water must be added very cautiously, or a fluid mass will result instead of a paste. The mass is then dried and powdered. In drying, it forms a very hard and tough residue, which adheres tenaciously to the plates on which it was dried, and is difficult to powder. Greasing the plates only partially helps the sticking, and it is likely to give a

greasy appearance to the finished preparation. Since this mixture contains about two-thirds of the entire amount of citric acid in the preparation and there is an excess of only 1½ per cent. of acid, a slight loss in removing the mass from the plates and in powdering it results in an alkaline preparation instead of an acid one. I made the effervescing salt some ten years ago four times in succession, and only the last lot was acid in reaction. The tedium of that massing, drying and powdering process is still fresh in my mind.

Finally, the sugar, bicarbonate and citric acid is to be mixed with the powdered mass, and the whole formed into a granulated salt in the usual manner.

This yields a preparation which effervesces copiously when dropped into water, but the last portions pass into solution very slowly, and the liquid remains opalescent for several hours.

Thus the increased cost of the official preparation is due not only to the added value of the magnesium carbonate, and the extra amount of citric acid required, but to the expense of forming and powdering the citrate, in itself a slow, tedious and difficult operation. Add to this the fact that the final preparation does not yield a clear and bright solution, and it is not to be wondered at that manufacturers have persistently tabooed the preparation and offered substitutes in its stead.

The substitutes offered have been mostly magnesium or sodium sulphate, combined with citric or tartaric acid, bicarbonate of soda and sugar. Some have contained Rochelle salt, and some a mixture of this with a sulphate.

In examining a number of commercial preparations several years ago, I found one which for its ingenuity was worthy of a better recognition than that allowed under a false label.

Analysis showed this preparation to have the following composition:

Magnesium citrate	2 parts.
Citric acid	18 "
Tartaric acid	24 "
Potassium bicarbonate	16 "
Sodium bicarbonate	29 "
Sugar	11 "
To make	100 "

When this is dissolved in water, the reaction between the two bicarbonates and the tartaric acid produces Rochelle salt to the ex-

tent of 45 per cent. of the mixture. Thus the mixture not only gave a more copious effervescence when dissolved than any other salt, but the finished solution also contained a larger proportion of active ingredient than any other examined.

The object of including magnesium citrate seemed to be, as with some others examined, to insure a qualitative test for magnesium, if such should be tried.

Whatever may be said as to the virtues of magnesium citrate, the public has in effect declared its satisfaction with the substitutes and its unwillingness to pay the added cost in order to get the true preparation; and the medical profession seem to have acquiesced in this decision.

The British Pharmacopœia has recognized the futility of advocating an unvalued ideal, and has given an effervescing sulphate of magnesium its official recognition.

If the forthcoming U. S. Pharmacopœia will sanction an effervescing Epsom, or Rochelle or Glauber's salt, it will promote uniformity in these preparations, but to continue the present obsolete preparation is but to encourage variability and substitution.

Even the official solution of magnesium citrate is frequently found to consist mostly of sulphate, and it is probable that a large proportion of the bottles sold contain sulphate in place of citrate. The arguments in favor of recognizing this are similar to those which apply to the granular salt, but are not as strong. In my opinion, however, the effervescing sulphate solution is quite as acceptable to patients and physicians, and it would be the part of wisdom for our Pharmacopœia to sanction it. The physician or patient cares naught whether a preparation is recognized by the Pharmacopœia so long as it is satisfactory to himself.

RECENT LITERATURE RELATING TO PHARMACY.

SANTONIN ASSAY.

An elaborate critique of the several suggested methods of assay of santonin by J. Katz (*Arch. der Phar.*, 1899, 245) indicates that none are sufficiently trustworthy; hence the writer has devised a process which he claims is reliable within 1 per cent. In his process, 10 grammes santonica is extracted with ether, in a Soxhlet apparatus, for two hours and the solvent distilled off. The residue

is then cooked with 100 c.c. 5 per cent. barium hydrate solution, with upright condenser for one-quarter to one-half hour. Carbon dioxide is passed through the cooled liquid, until it is acid, when the precipitated barium carbonate is removed by filtration, the precipitate being washed twice with 20 c.c. water. The filtrate is then condensed to 20 c.c., to this 10 c.c. 12½ per cent. hydrochloric acid is added and the mixture heated on water-bath for two minutes only. It is then poured into a separatory funnel, the dish being rinsed with 20 c.c. chloroform, which is also poured into the funnel and used for extraction. This chloroform extraction is repeated twice, each time with 20 c.c., the chloroformic extract being filtered, the solvent distilled off and the residue cooked (inverted condenser!) with 50 c.c. 15 per cent. alcohol for ten minutes.

The alcoholic solution is filtered into a tared flask and allowed to stand twenty-four hours, when the mother liquid is separated from the santonin crystals, through a tared filter. The flask and filter are then washed with 15 per cent. alcohol and then dried and weighed. To the figures thus obtained must be added about 0·006 gramme santonin to each 10 c.c. alcoholic filtrate, since the substance is that soluble in 15 per cent. alcohol. The article closes with modifications of the process applied to santonin lozenges and confections, in which event the original ether extraction is unnecessary, the substance being immediately treated with barium hydrate solution.

H. V. Arny.

A SUBSTITUTE FOR CATECHU.

The *Swiss Journal of Chemistry and Pharmacy* (1899, p. 313) reports that a dyestuff of French Cochin-China—an extract of the bark of a mangrove tree (*Brugniera gymnorrhiza*)—has been found to answer all the purposes of catechu, the yield of which is becoming insufficient for the demand. The colonial ministry of France has taken up the matter and is inaugurating the cultivation of the tree and the preparation of the extract, which is called Cay-Da.

H. V. A.

NARCOTIC EXTRACTS.

A brochure by M. Altan (abstract in *Schw. Wochsch. für Chem. und Pharm.*, 1899, 333) studies the narcotic extracts carefully and thoroughly, but shows the usual fault of continental writers—total ignorance or studied neglect of the Pharmacopœia of this country.

Thus, he urges the necessity of manufacture by percolation with appropriate menstrua, instead of maceration with alcohol; praising the Swiss and British (1898) Pharmacopœias for the innovation (method of U.S.P. 1880!). Again, he praises the two pharmacopœias above mentioned as pioneers of assay of extracts of nux vomica, opium and belladonna. His other conclusions are that dry extracts are preferable to those of pilular consistency, and the best method of assay is that of Keller (see this JOURNAL, 1893, p. 78; 1894, p. 42; 1897, p. 450), the titration being performed with iodine eosin as indicator. H. V. A.

ESTIMATION OF GLYCYRRHIZIN.

The following assay of extract of glycyrrhiza is suggested by B. Hafner (*Ztschr. Oest. Ap. Ver.*, through *Ap. Zt.*, 1899, 558). To 10 grammes dry extract placed in Erlenmeyer flask is added 200 c.c. 95 per cent. alcohol and then 20 c.c. normal sulphuric acid; the mixture being digested with agitation for several hours. The insoluble residue is separated by filtration and is washed on filter with alcohol till filtrate is colorless. To this alcoholic filtrate is added 100 c.c. water and enough ammonia to make it alkaline. Whereupon the alcohol is evaporated on water-bath and enough water is added to bring residue to 100 c.c. From this liquid, the glycyrrhizin is precipitated by diluted sulphuric acid and the precipitate collected on filter and washed with 2 per cent. sulphuric acid until filtrate is colorless. The filter containing precipitate is transferred to a beaker and extracted with acetone two or three times, the solution being treated with excess of moist barium carbonate and the acetone evaporated. 200 c.c. hot distilled water is gradually added to the residue with stirring and the mixture is located on water-bath till excess of barium carbonate is fully settled. The solution of the barium compound of glycyrrhizin is then filtered off and the filter washed until 500 c.c. filtrate is obtained.

The glycyrrhizin in 100 c.c. of this filtrate is estimated either by weighing the dry barium compound (factor 0·8153) or by converting the barium to sulphate and weighing as such. H. V. A.

DERIVATIVES OF DIGITALIS.

The classical researches of Kiliani on digitalis (this JOURNAL, 1899, p. 379) are being continued by the professor and his students.

He reports (*Arch. Pharm.*, 1899, 446, *et seq.*) that the formula of

digitoxin is $C_{34}H_{54}O_{11}$, basing same on the formulæ of its products of hydrolysis; the reaction being

$$\underset{\text{Digitoxin.}}{C_{34}H_{54}O_{11}} + H_2O = \underset{\text{Digitoxigenin.}}{C_{22}H_{32}O_4} + 2\underset{\text{Digitoxose.}}{C_6H_{12}O_4}.$$

The formula ascribed to digitoxose he bases on its oxime $C_6H_{12}O_5NOH$ and its derived acid $C_6H_{13}O_4COOH$, the calcium salt and lactone of which were isolated and analyzed.

The formula of digitoxigenin given above is proven by molecular weight estimation, by the combustion of an anhydro-digitoxigenin, $C_{22}H_{30}O_3$, made by treating the substance with strong hydrochloric acid, and by a hydrated product obtained by treating digitoxigenin with sodium hydrate. This body—$C_{22}H_{33}O_5Na.H_2O$—is the sodium salt of an acid called by the writer dixgeninic acid.

A further proof of the above formula of digitoxin is the product obtained by heating the substance with sodium hydrate in a pressure flask. This product, on being treated with calcium chloride, yielded a calcium compound—$(C_{34}H_{55}O_{12})_2Ca.3H_2O$—the acid of which, $C_{34}H_{56}O_{12}$, he calls digitoxinic acid.

Oxidation of anhydro-digitoxigenin, with chromic acid, yielded a product, $C_{19}H_{24}O_3$ or $C_{20}H_{26}O_3$, which is termed toxigenone. Kiliani then discusses the composition of "digitalinum verum." This, he thinks, is $C_{35}H_{56}O_{14}$, basing his opinion on its dissociation products, he thinking the reaction to be:

$$\underset{\text{Digitalin.}}{C_{35}H_{56}O_{14}} = \underset{\text{Digitaligenin.}}{C_{22}H_{30}O_3} + \underset{\text{Dextrose.}}{C_6H_{12}O_6} + \underset{\text{Digitalose.}}{C_7H_{14}O_5}.$$

The above formula of digitaligenin he bases on molecular weight estimations and on combustion figures. However, the data obtained from both these sources agree equally well with the formula $C_{23}H_{32}O_3$; hence it is possible that the formula of digitalin may be $C_{36}H_{58}O_{14}$.

Oxidation of digitaligenin with chromic acid yielded a product identical with toxigenone, mentioned above; thus showing genetic relationship between digitoxigenin and digitaligenin.

The digitalose formula of the above reaction is based on a lactone, $C_7H_{12}O_5$, obtained on treating the sugar with bromine. As another product of the bromine reaction was d-gluconic acid, the writer assumes that dextrose was a second product of the hydrolysis of digitalin. The lactone, $C_7H_{12}O_5$, on cooking with

calcium carbonate, yielded the calcium salt of the corresponding acid, $C_7H_{14}O_6$, which the writer calls digitalonic acid. This salt differs from its metameric salt of the digitoxose acid mentioned above, by charring without melting, at 100°.

With A. Windaus, Professor Kiliani investigated digitalëin, a product of the commercial German digitalin, the degree of purity of the product being estimated at each stage of its extraction by physiological tests on the frog. The extreme care in this concentration is especially noteworthy.

Starting with 1 kilo of the commercial digitalin, this was freed from digitonin, "digitalinum verum" and impurities by Kiliani's method of extraction and this concentration was found to effect heart systole on a frog in doses of 7 milligrammes. This product was dialyzed and the dried dialysate (yield, 40 grammes) was found fatal to the frog in doses of 3 milligrammes. This dialysate was further purified by precipitation with tannin and subsequent separation of the tannin from the precipitate with zinc oxide. This product (weight, 15 grammes) was further purified by fractional crystallization with alcohol and ether. The first fraction produced no systole, the second was not tried, but the remainder, on evaporation of the solvent (yield, 4 to 5 grammes), worked systole in doses of 0·4 milligramme. This product, digitalëin, was obtained in too small quantities to be fully examined. It was analyzed, but no definite formula could be deduced from the combustion figures. It showed glucosidal properties and its aqueous solution had acid reaction. Further investigation seemed to show that it was a lactone, becoming, by hydration in solution, an inert acid.

Both infusion and tincture of digitalis contain digitalëin; the infusion from 10 kilos leaves yielding 2 grammes of a product, 0·6 milligramme of which produced systole on the frog; while the alcoholic extract from 10 kilos yielded 150 grammes of a body producing systole in doses of 1·5 milligrammes. Further concentration of the latter body was too wasteful to be successful.

The last article in the interesting series was one on digitogenin and its constituents. H. V. A.

THE REFRACTOMETER APPLIED TO VOLATILE OILS.

Taking as text the statement of Gildemeister and Hoffmann, in their work in volatile oils, that the refractometer has but little value

in the examination of these bodies, C. Hartwich (*Ap. Zt.*, 1899, 384) combats the assertion, showing by elaborate tables that the data thus obtained is as reliable and as distinctive as is specific gravity and polarization index. H. V. A.

PHILADELPHIA HOSPITAL FORMULARY.

[*Continued from page 133.*]

LINIMENTA.

Linimentum Chloroformi Compositum.

Tr. Aconite	4 fl. dr.	15 c.c.
Tr. Arnica	1 fl. oz.	30 c.c.
Water, Ammonia (17·5 per cent.)	1 fl. oz.	30 c.c.
Lin. Chloroform, to measure	6 fl. oz.	180 c.c.

Linimentum Gaultheriæ Compositum.

Oil, Gaultheria	4 fl. dr.	15 c.c.
Alcohol	2 fl. oz.	60 c.c.
Tr. Capsicum	4 fl. dr.	15 c.c.
Liniment, Soap, to measure	6 fl. oz.	180 c.c.

Linimentum Terebinthinæ Comp.

Oil, Turpentine	1 fl. oz.	30 c.c.
Water, Ammonia	1 fl. oz.	30 c.c.
Lin. Soap, to measure	6 fl. oz.	180 c.c.

LIQUORES.

Liquor Acidi Borici.

Acid, Boric	16 gr.	1 gm.
Water, Distilled, to measure	1 fl. oz.	30 c.c.

Liquor Acidi Carbolici.

(1-40, 1-20).

Liquor Antiseptica Alkalinus.

Sodium Borate	1 dr.	4 gm.
Sodium Bicarbonate	1 dr.	4 gm.
Sodium Salicyl.	4 gr.	0·25 gm.
Menthol	1 gr.	0·065 gm.
Thymol	1 gr.	0·065 gm.
Glycerin	6 fl. dr.	23 c.c.
Water, Boiling, to measure	4 fl. oz.	120 c.c.

One teaspoonful to be added to two tablespoonfuls or more of water, to be used as a wash.

Liquor Antisepticus.

An antiseptic solution containing:

Menthol, Thymol, Sodium Benzo-Borate, and the essential principles of Gaultheria and Eucalyptus, in aqueous solution, with 25 per cent. by volume of Alcohol.

EDITORIAL.

THE CULTIVATION OF MEDICINAL PLANTS.

The time is not far distant when we will be as dependent upon the agriculturist for timber and medicinal plants as we are to-day for many of the food products yielded by plants. The importance of the preservation of forest trees is becoming more and more apparent in the legislation, both State and National, which is being effected concerning it. However varied the causes which have tended to a destruction of the wooded areas in the United States, in some cases amounting to one-sixth of the total area, it must be said that the training of men fitting themselves to arrest this devastation and assist in the cultivation of useful trees is but beginning. No one can say how many useful trees will have been entirely exterminated, and no one can prophesy how long a time will be required before the work about to be started will yield profitable returns. While we have reason to believe that the more useful plants and animals, for food purposes, have been preserved, still, even this is open to question, as we know that cultivation has been an important factor tending towards the preservation of existing species in the plant and the animal kingdoms.

There is more or less mutual dependence among plants, and it is very seldom that a plant community is composed of a single species. Generally we find a number of species growing together, each contributing to the welfare of the other. Some perennials provide shade for some of the annuals; some produce mechanical supports, as in the climbing plants; some are dependent upon others for either producing soil (as in marsh plants) or enriching it (as in the plants of Leguminosæ); some are parasitic (as in the Loranthaceæ); others are saprophytic (as in the Orobanchaceæ), and still others have a symbiotic relationship, as was pointed out in a previous editorial in this JOURNAL (1900, p. 42).

The ecological relationship of plants and animals is only now beginning to be studied as a distinct branch of science. Some failures in the transplanting and cultivating of plants may be directly attributed to lack of knowledge of not only general climatic and soil conditions, but more especially of what may be their biological relationship due to environment. If there is, then, this mutual beneficial relationship between certain plants, then,

in the destruction of any one class of individuals, there is not only one class, but a number of classes, concerned. So that, in the destruction of trees or other plants (as so-called "weeds") for any purpose or lack of purpose, not only are certain plants destroyed, but those dependent upon them or in near relation to them are also affected.

The modern agriculturist recognizes this interdependence of certain plants in his "rotation of crops," but it appears that there is even a still greater application of the principle as carried out among living plants in their native haunts. The remarks of George W. Sloan, President of the American Pharmaceutical Association in 1880, are still worthy of consideration by those concerned primarily in the cultivation of medicinal plants, when he said it is "a question whether or not we are losing or at least diminishing in the production of many of our native medicinal plants, and if, in fact, the destruction of our forests will not lose to us many of the medicinal herbs and shrubs which we have grown accustomed to regard as inexhaustible, simply because they were indigenous."

These remarks are suggestive of the importance of preserving our primitive forests from another point of view, namely, that of preserving the food and medicinal plants found growing in them, or protected by them as it were, which question has not met with the consideration that it deserves.

Mr. Sloan[1] observes that around Indianapolis, "a few years ago, senega, Hydrastis canadensis, Cypripedium pubescens and several other articles were freely offered, while ginseng (*Panax quinquefolia*) was in profuse abundance, being gathered and shipped by the ton. Of these, with the exception of the latter, I have scarcely had a sample offered in nearly twenty years. The locality was heavily timbered and a dense undergrowth prevented to a great extent the pasturage of the land. After the undergrowth was cleared, even if the timber was left standing, the soil became more dry. The pasturing of the land by the various domestic animals has also contributed towards the eradication of small plants and shrubs. Another writer, from Missouri, says the principal medicinal plants that have become scarce from the clearing of the country are ginseng, senega, serpentaria, spigelia, Arum triphyllum, cypripedium and hydrastis.

[1] *Proc. Amer. Pharm. Assoc.*, 1880, p. 502.

Many others that were formerly abundant in Ohio, Indiana and Illinois are now very scarce there and are largely supplied from the States west of the Mississippi." It may be added that the great herb-gathering district in the United States at the present time is in the Blue Ridge districts of North and South Carolina and Tennessee. Judging from the destruction of wooded land and taking into consideration the fact that this region has offered unusual opportunities to the capitalist and others, we may expect, in the course of not many years, a repetition of the history of the destruction of drug-yielding plants in the Northern States.

If this should be the case, then it is apparent that drug farms will be a necessity and would offer peculiar inducements to those prepared to take advantage of the opportunity offered.

Many experiments have been made in the cultivation of plants and the results have been uniformly successful so far as the products produced are concerned. In the address[1] referred to is given the substance of replies from a large number of experimenters on this subject. The following are the names of some of the plants the cultivation of which has been successful in the United States, and the products have been at least equal to, and in some cases superior to, either the imported drugs or those from wild plants:

Althæa, taraxacum, calamus, catnip, motherwort, pennyroyal, peppermint, scullcap, the docks, etc.

In a recent letter from Messrs. Allaire, Woodward & Co., of Peoria, Ill., on this subject, they state that many medicinal plants are now being successfully cultivated in Michigan, such as peppermint, motherwort, boneset, tansy, sage and horehound.

Many important articles bearing on the subject of the cultivation of medicinal plants have appeared in the past ten years, and we append the following: (1) On the general subject of the cultivation of drug-yielding plants;[2] (2) the influence of cultivation upon medicinal plants;[3] the effects of soil and cultivation on the development of the active principles of plants;[4] the cultivation of medicinal herbs in Germany, with an enumeration of the plants successfully grown;[5]

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[1] *Loc. cit.*

[2] *Zeitschr. Oest. Apoth. Ver.*, 1893, p. 157, p. 303; *Pharm. Post*, 1892, p. 675, p. 1021; 1893, p. 93, p. 497; *Deutsch.-Amer. Apoth. Zeit.*, 1894, p. 164.

[3] AMER. JOUR. PHARM., 1862, p. 268.

[4] AMER. JOUR. PHARM., 1866, p. 45.

[5] *Chem. and Drug.*, 1893, p. 912; abstract in *Proc. A. Ph. A.*, 1894, p. 863.

the cultivation of medicinal plants in Russia;[1] the cultivation of medicinal plants in Milly;[2] the cultivation of medicinal plants in Lincolnshire,[3] Cambridgeshire,[4] and Banbury;[5] the cultivation of perfume plants in Australia;[6] cultivation of medicinal plants in Jamaica;[7] an enumeration of the drugs gathered in Pennsylvania, together with their localities and quantities;[8] the names of medicinal plants of commercial value that are gathered in North Carolina, with their value, and the relative amount sold in this country and exported.[9]

We are happy to present elsewhere a valuable paper by Mr. F. B. Kilmer, on the cultivation of drugs in Europe.

It is the economical side of the question of the cultivation of medicinal plants that has not been as encouraging as those who venture into new undertakings as a rule desire. While the cultivation of medicinal plants has been successful as to the quality of the product, the financial results have not been so satisfactory. Messrs. Allaire, Woodward & Co. state that in regard to the drugs cultivated in Michigan the profits are small, as all of the articles cultivated also grow wild in the South and are gathered by negroes and the poorer class of whites, who are willing to work for little money and are satisfied with but 50 cents per day. We have already alluded to the fact that the difficulty of securing cheap labor is the greatest hindrance in this country to the obtaining of financial success in the cultivation of certain useful plants, as those yielding camphor, rubber, etc. It would seem, however, that at the present time no one need expect immediate financial returns in the cultivating of medicinal plants unless the item of labor is also considered along with the other aspects of the subject. Much experimentation is,

[1] *Pharm. Jour. Trans.*, 1897, p. 58.

[2] *Rép. de Pharm.*, 1892, p. 375; also *Pharm. Jour. Trans.*, 1892, p. 184.

[3] *Pharm. Jour. Trans.*, 1881, pp. 237–239.

[4] *Pharm. Jour. Trans.*, 1889, p. 122; reprinted in AMER. JOUR. PHARM., 1889, p. 510.

[5] *Pharm. Jour. Trans.*, 1877, June 16; reprinted in AMER. JOUR. PHARM., 1877, p. 406.

[6] *Amer. Drug.*, 1896, pp. 327–328; 356–357; abstract in *Proc. A. Ph. A.*, 1896, p. 499.

[7] *Chem. and Drug.*, 1889, p. 219; abstract in *Proc. A. Ph. A.*, 1890, p. 397.

[8] *Proc. Penna. Pharm. Assoc.*, 1886, pp. 140–148.

[9] *Proc. A. Ph. A.*, 1894, p. 210; reprinted in AMER. JOUR. PHARM., 1894, p. 486.

however, necessary in working out this subject in its various phases. In the first place, quality and quantity of yield may be made commensurate with relatively high price labor. Certain classes of plants, as annuals and biennials, are more likely to yield immediate financial returns than the perennials. The same may be said of those plants that have been successfully cultivated, either on a small or large scale, over those that have not been experimented with in this direction. In the study of the flora of any particular locality it is possible to ascertain what plants are likely to be suited for experimentation; as, for instance, in localities where certain species of aconite are found it is likely that *Aconitum napellus*, L., may be successfully cultivated. It is well to remember that not every one can make a success of drug farming and that it requires men who are competent both by proper training and inclination. This matter will be considered again in later issues of this JOURNAL.

EDITORIAL NOTES AND COMMENTS.

CREDIT WHERE CREDIT IS DUE.

While a number of exchanges are accustomed to publish, either in full or in part, articles appearing in this JOURNAL, and while these for the most part observe the custom of giving credit, we note a disposition among others to entirely overlook the latter feature. While we might desire to appear magnanimous in regard to this matter, still there is a principle involved which, if lost sight of, would reflect discredit not only upon those disregarding it, but upon pharmaceutical journalism in general.

LIMITATIONS OF THE U.S.P. TESTS.

The matter of the limitations of the pharmacopœial tests is one of great moment, inasmuch as the laws of trade and commerce are being made to conform to these standards. Dr. E. R. Squibb considers that the quality of the drugs of the three large markets should be *accurately* ascertained, and the U.S.P. testing should be adjusted to the higher limits. Using asafetida (see this JOURNAL, 1900, p. 97) as an illustration, Dr. Squibb mentions the fact that the U.S.P. requires that 60 per cent. be soluble in alcohol. "The B.P. requires not less than 65 per cent. Mr. Umney thinks this too high; so high that the market cannot supply it, and has failed to supply it. Mr. E. M. Holmes shows that the market does supply it and has always supplied it to

those willing to pay the price, and that market price is *the* limitation of quality which should be guarded against on pharmacopœial authority. Otherwise quality runs down with price. Witness also aloes as another striking example of the unsafety of the market as a basis for a pharmacopœial standard. Prices ranging from 7 to 16 cents per pound with the downward screw of price still on, while good red socotrine aloes is an impossibility at less than 30 to 35 cents, and, as this should be so, this grade is very liable to be absent from the markets until the price is there to meet it, and the pharmacopœial tests are the agencies to justify the proportion between tests and prices, and both tests and prices must be high if good drugs are to be kept in the markets."

WORM-EATEN DRUGS AND THEIR ACTIVE PRINCIPLES.

The question as to whether drugs which are worm-eaten are deficient in active principles has often been asked, and the matter is deserving of extended investigation. Messrs. Schimmel & Co. call attention to the fact that the commercial oil of nutmegs "is made from the light, worm-eaten seeds, of which large quantities are rejected in sorting the different qualities in Holland. The worm most strangely robs the nutmeg of its fixed oil, whilst the essential oil remains in the seed in full." It is interesting to note that while in the nutmeg the insect has an ability to select its food from the storehouse of material as contained in the seed, yet there appear to be numerous illustrations (see editorial in this JOURNAL, 1899, p. 147) in which certain animals are wholly immune to certain plant poisons, *i. e.*, the poisons enter the digestive system but apparently do not affect the organism.

THE MICROSCOPICAL EXAMINATION OF ADULTERATED DRUGS.

The necessity for making any arguments to show either the necessity or usefulness of the microscope in the examination of drugs has been replaced by the efforts of a number of workers demonstrating its value in practice. Daniel Base, in a paper read before the Maryland Pharmaceutical Association, shows the value of the microscope in the examination of commercial specimens of ginger, capsicum, gamboge, etc. His results are as follows:

Ginger.—The four specimens assayed were examined microscopically. Nos. 1, 2 and 3 found to be pure. No. 4 was moderately

adulterated with corn starch, gathered in lumps and easily recognized by the polygonal shape and distinct star-like cleft nucleus of the grains.

Capsicum.—Samples 1 and 2 were pure. Sample 3 was adulterated with wheat flour, agglomerated in flakes, which could be seen even with the naked eye on close inspection. Sample 4 was adulterated heavily with corn starch and another kind of starch, consisting of compound granules, which were made up of small angular grains, perhaps oat starch. Judging roughly, the adulteration seemed to be 40 to 50 per cent. In spite of this fact, the color of the powder was darker than that of 1, 2 or 3.

Gamboge.—Samples 1, 2 and 4 were adulterated, apparently with dextrine made from corn starch. Many of the starch grains were well defined, and assumed a blue color with iodine. The dextrine particles were somewhat star-shaped, and were colored purple by iodine. On adding dilute caustic soda, the gamboge was quickly dissolved, leaving the starch and dextrine granules standing out prominently; these, however, were soon decolorized, swollen, and, finally, dissolved.

Sample 3 was heavily adulterated with wheat flour, which showed the characteristic rounded and oval grains of various sizes, together with cell-wall fragments.

Black Pepper.—The four samples were apparently pure.

Castile Soap.—Samples 1 and 2 contained a small quantity of corn starch and some small, rounded granules, which stained yellow with iodine, thus seeming to be proteid in nature, and, no doubt, were aleurone grains. A few cell-wall fragments were also found. Very likely the adulterant was corn meal.

Sample 3 was pure. Sample 4 contained a small quantity of corn starch and some cell fragments.

Rhubarb.—
Jalap.—
Socotrine Aloes.— } All samples seemed to be pure.

"It thus appears that adulterated drugs are found on the market, and that the pharmacist might profitably bring to bear on this subject the use of a microscope. It is also clear, from an investigation of this kind, that it is important, in these days of powdered drugs, to teach the use of the microscope to the students of colleges of pharmacy. Unfortunately, so many pharmacists, older as well as newly

graduated, are indifferent to the matter of adulterations and rely too much on the wholesaler to furnish pure articles. While many wholesalers can be relied upon, others evidently cannot, and the pharmacist ought to consider it his duty to try to discover who the unreliable ones are, not only for his own interest, but also for the interest of those who patronize him. If he buys adulterated drugs, he is a victim of a fraud, and if he sells the same drugs, he is guilty of the same fraud, although it may be unconsciously perpetrated."

COLLECTING CRUDE DRUGS.

From the inquiries received by the editor of this JOURNAL regarding the collecting of crude drugs and the possibilities of the subject, the following circular letter issued by Allaire, Woodward & Co., which we are permitted to publish, gives the important points concerning the time of gathering the drugs, the quantities necessary to be gathered for profit, and some other facts regarding the subject which will be useful to those interested in the subject:

"The business of collecting roots and herbs in most cases is not a profitable one. It is followed so largely by a class of people who would rather earn 50 cents a day in this way than three times the amount at some steady employment that it offers very little inducement as a means of earning a livelihood. In the Southern States these goods are taken in trade at the cross-road stores, examined, graded and pressed in bales suitable for shipping, and it is from this source that we obtain a large part of our supplies.

"The following directions for gathering may be useful. Flowers should be gathered when in their full bloom, or just before they begin to fade and become dark. They should be carefully dried in the shade. Leaves and herbs should be gathered at the time they are in blossom, kept free from all large stems, grass and other foreign matter. Dry in the shade to preserve the bright green color. Barks should be gathered when they peel easiest; all the outside portion or 'ross' should be shaved off before peeling. *Barks* of the *roots* of shrubs and trees need not be rossed, but should be washed clean and scraped before peeling; care should be used not to expose to dew or rain in drying. Gentle fire heat or exposure to the sun may be used in drying barks. Roots should be dug very early in the spring before plant growth begins, or late in the fall after the top has dried—*never* during the growing season; roots dug

in June and July weigh very little and are of inferior quality for medical use. They should be thoroughly washed and *dried* before shipping.

"Prices are constantly changing; golden seal, senega, ginseng, lady's-slipper, serpentaria, prickly ash berries, generally command good prices, because not very abundant, while mandrake, blood root, black cohosh, etc., though used very largely, are rarely worth more than 4 cents per pound in Peoria. Other articles are at times extremely scarce and bring high prices—prices never go up when any one has anything to sell, therefore don't try to speculate.

"Quantities—we never buy small lots of goods. We prefer to buy a year's stock of an article at one time. We save in the labor of handling, storage, etc., and unless you can procure 100 to 1,000 pounds of one article ready for shipment and think you have better facilities for supplying this article than any one else it will be useless for you to write us. We do not want to contract with parties unknown to us, for the delivery of goods at a future date. If you have anything on hand ready for shipment and wish to sell it to us, you should send a fair sample by mail, and write us stating how many pounds like sample you have to offer. If we need the goods we will name a price for them. We never buy green or undried goods—they would mould on the way and be worthless on arrival. Don't try to sell dirty goods—buyers are quite as shrewd as sellers. All receipts are carefully examined, and if not up to sample or prime in quality are rejected and held at the risk of the owner. If you send sample or ship goods, put your name on each package, so we may know whom it is from."

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

VICTOR VON RICHTER'S ORGANIC CHEMISTRY OR CHEMISTRY OF THE CARBON COMPOUNDS. Edited by Prof. R. Anschütz. Authorized translation by Edgar F. Smith. Third American from the Eighth German Edition. Vol. II. Carbocyclic and Heterocyclic Series. Philadelphia: P. Blakiston's Son & Co. Price, $3.

The English translation of Richter's organic chemistry is well known to chemists, and has merited a deserved recognition by all who are in any way concerned in chemical work. The present volume contains much of value to the pharmaceutical chemist, and

the manufacturer of chemical products. While it is terse in the consideration of the historical features of some of the more important compounds considered, yet the extended references to literature serve to make it of great value in indicating the successive steps in the progress of the science. The manner of preparation of the compounds is likewise given in a few words, which generally is sufficient to put the investigator on the track of the information he desires. The bibliographical references to this part of the subject have been carefully prepared, while the properties of the compounds discussed are fully and carefully considered. One of the most valuable features of the book is the insertion of graphic formulæ wherever possible. The portions of the book of particular interest to the pharmaceutical chemist are those treating of the alkaloids, bitter principles, glucosides, terpenes, etc. The Index has been well prepared, and has been sufficiently elaborated to make the work even more useful.

DIE ROHSTOFFE DES PFLANZENREICHS. Versuch einer technischen Rohstofflehre des Pflanzenreiches von Dr. Julius Wiesner. Zweite gänzlich umgearbeitete und erweiterte Auflage. 1 Lieferung (Bogen 1–10) mit Textfigur 1–46. Leipzig: Verlag von Wilhelm Engelmann. 1900.

The first edition of this valuable work of Professor Wiesner appeared in 1873, and has since that time been used constantly as a work of reference by botanists and those interested in the practical consideration of the various plant constituents. The book is to be revised by Professor Wiesner, with the assistance of a number of prominent botanists, chemists and others. The work is to appear in about ten parts, at 5 marks each. The first volume, and possibly the entire book, will be completed by the end of 1900. The first part has just appeared, and contains, besides an elaborate introduction, an exhaustive treatise upon the gums. The chapter on the resins has been commenced, but will be continued in Part II. The work promises to be an exceedingly valuable one. The co-operation of eleven specialists whose work is already well known is a sufficient indication of the thoroughness which will characterize the book when completed.

PRÉCES DE PHYSIQUE PHARMACEUTIQUE par le Dr. C. Sigalas. Lyon: A. Storck & Cie., Editeurs. 8 Rue de la Mediterranée 1900.

The importance of the study of physics in any of the sciences and arts is becoming more and more recognized, and any work which has for its object the study of physics primarily for the student of pharmacy and medicine is indeed welcome. The work before us is to be looked upon rather as a good book in physics, with numerous illustrations which are applicable not only in medicine and pharmacy, but to all of the arts and sciences.

MISSOURI BOTANICAL GARDEN. Eleventh Annual Report. St. Louis, Mo.: Published by the Board of Trustees. 1900.

The reports of the officers of the Board, as well as the annual report of the Director, show that the work of the Garden is progressing satisfactorily. The scientific papers published are, as usual, of a high order, and treat of various botanical subjects.

A POCKET MEDICAL DICTIONARY. By George M. Gould. Fourth Edition. Revised and enlarged. 30,000 words. Philadelphia: P. Blakiston's Son & Co.

Besides the definitions and pronunciations of more than 30,000 words, the Dictionary contains fourteen different tables for hasty reference, such as a dose table; table of tests used in medical practice; comparison of thermometers; table of weights and measures; symbols and abbreviations; the origin and distribution of the arteries; the occurrence and character of bacteria, etc. The work is conveniently arranged, of a handy size, and so well prepared that it promises to be even more popular than the previous editions.

PROGRESS IN PHARMACY AND THERAPEUTICS. Reported in "Notes on New Remedies," from September, 1898, to December, 1899, with Index. New York City: Lehn & Fink, 128 William Street.

This work of a little over 100 pages is a complete record of every advance in the domain of pharmacy and materia medica in the period under review which is likely to be of practical benefit or of scientific interest to pharmacists in the pursuit of their profession. Material of only apparent novelty and of doubtful value, as also a large number of new remedies of fantastic names and with no promise of recognition by the medical profession, has been disregarded entirely.

The work has been remarkably well done. It is furthermore so thoroughly systematized and the literature has been so well sifted that the work presents a connected review of the progress in phar-

macy and therapeutics. The disposition of the publishers to consider that pharmacy is developing into an independent science is well borne out by the facts presented. The work will be distributed free of charge to those who desire it.

MINUTES OF THE PHARMACEUTICAL MEETING.

The stated pharmaceutical meeting was held Tuesday, March 20th, with James T. Shinn in the chair.

The minutes of the preceding meeting were allowed to stand as published.

Considering the variety and importance of the subjects presented, as well as attendance, the meeting was one of the most successful of the present series.

Mr. F. B. Kilmer, of New Brunswick, N. J., was the first speaker, and made a most interesting address on the subject "In Lands where Drugs Grow," which was illustrated with lantern views (see page 155).

Those taking part in the discussion of the address were the Chairman, Prof. C. B. Lowe and Messrs. J. W. England and E. M. Boring. Replying to a question by Mr. England in regard to the cultivation of medicinal plants in the United States, Mr. Kilmer said that at the present time it could not be looked upon as a success, that is, from the point of view of an American. But, looked at from the point of view of the English or Germans, the question is somewhat different, for with them $5,000 is almost equivalent to $25,000 with us. He pointed out that much of the labor which is done abroad in the cultivation of drugs by hand could probably be done here with machinery. He said that many of the drugs growing in Europe can be cultivated here, and remarked, in this connection, that the question is one which colleges of pharmacy and agricultural experiment stations should take up. As to the relative therapeutic value of the green and dried drugs, Mr. Kilmer said that this was a question which had not been sufficiently investigated to enable him to answer it, although he believed there was a marked difference.

In regard to the effects of the plants on the drug gatherers, Mr. Kilmer said that the subject was rather a curious one; either those who handle the drugs become immune in a way, or else the active principles require some time to develop.

A paper by Prof. Wilbur L. Scoville, of the Massachusetts College of Pharmacy, on "Effervescing Citrate of Magnesium," was read in behalf of the author by Prof. F. G. Ryan (see page 175). In commenting on the subject of the paper, Professor Ryan said that no manufacturer would attempt to use the official process on account of its expensiveness and tediousness. He said that the process now used by manufacturers is to heat the component materials in a jacketed kettle until soft and then to use a paddle for granulating the mass.

A paper containing much useful information, and having the title "Microscopic Study of Urine, Sputum and Blood by Pharmacists," was read by Dr. L. Napoleon Boston (see page 170).

Professor Kraemer remarked that there are very few stains available which yielded uniform results in the hands of a large number of different investigators. As the result of a discussion among several plant cytologists recently,

it was shown that the same substance of different sizes and densities took up different stains. He further remarked that two other factors were equally important in securing uniform results, viz., the position of the object in the reagent and the necessarily varying strength of the solution of the reagent as well as the varying composition of most of the aniline stains. So that it was not always a lack of technique on the part of the worker which caused a variability in results, but that there must be more or less dependence upon the structures themselves, as well as the effects upon them with reagents, and he said that Virchow's principle of using as few reagents as possible and endeavoring to understand the structure of the object was the safest to follow.

Frederick T. Gordon, apothecary at the League Island Navy Yard, exhibited a simple apparatus for the estimation of urea, the estimation being based upon the amount of nitrogen evolved from a mixture of urine and chlorinated lime.

Prof. F. X. Moerk said that the apparatus was similar to that described by Dr. Squibb in 1884, the difference being that Dr. Squibb used Labarraque's solution instead of chlorinated lime for decomposing the urea.

Following the presentation of papers was an exhibition of specimens. Professor Moerk called attention to some specimens obtained through Mr. Geyer from Messrs. Baugh & Sons Co., Philadelphia, and representing products obtained from bones and skins in the manufacture of fertilizers. These included samples of glue, oils such as neat's-foot, light bone and marrow oil, and solid products, as lard stearin, tallow and bone grease.

Professor Ryan again exhibited the valuable collection of opium specimens, which was loaned for exhibition, at the previous meeting, by Messrs. Gilpin, Langdon & Co., and said that since then the collection had been presented to the College. He therefore moved that a special vote of thanks be conveyed to Messrs. Gilpin, Langdon & Co. for their gift and the motion was unanimously adopted.

On motion, the meeting adjourned.

FLORENCE YAPLE,
Secretary pro tem.

CHICAGO COLLEGE OF PHARMACY.

The second meeting of the Alumni Association of the Chicago College of Pharmacy for the discussion of pharmacopœial revision was held at the Palmer House, Wednesday evening, February 21st. The subject for discussion, for the evening, was "The Standardization of Drugs and their Preparations." The meeting was called to order by President W. B. Day and opened with an address by Dr. George F. Butler, Professor of Materia Medica and Delegate to the Convention from the College of Physicians and Surgeons. Dr. Butler treated of standardization as viewed by the physician. The necessity of uniformity and reliability of the medicines used by the physician was strongly dwelt upon, as being of the first importance; the variation in medicinal value of drugs grown or collected under varying conditions was pointed out, and the difficulties in determining just to what principles the physiological activities of some drugs are due was indicated. The speaker thought there was no difference of opinion among those engaged in medical service generally concerning the desirability of standardization, the question being as to how far standardization is practicabe.

A. D. Thorburn, Ph.G., gave the pharmacist's view of the subject, stating that he fully agreed with Dr. Butler concerning the desirability of the pharmacist being able to furnish a uniformly active and reliable medicine, but thought that great care should be taken that the requirements be not too exacting. The personal equation enters so largely into analyses, especially with the apparatus within reach of the every-day pharmacist, that a certain amount of latitude should be allowed. It mattered little to the prescriber, probably, whether a fifteenth or sixteenth of a grain of the active ingredient was contained in the teaspoonful dose.

Professor W. A. Puckner, delegate to the Convention from the Chicago College of Pharmacy, spoke from the chemist's standpoint. He stated, incidentally, that while the pharmacist and perhaps the physician would care to have standardized only a few staple preparations, yet the manufacturer would doubtless be pleased to have all standardized and this from no selfish motive, but simply to insure uniformity of product. He discussed whether a drug or its preparations or both should be standardized; whether the preparation should be diluted or concentrated to bring it to a definite strength, or if stronger and weaker preparations should be mixed in proper proportions to attain this strength. Also whether a definite standard or maximum and minimum standards should be adopted, and finally he discussed methods of assay.

In the course of the discussion following the addresses, Dr. H. N. Moyer stated that he prescribed few galenicals, for he found them frequently unreliable, and that he used the alkaloids largely. He thought that many of the newer remedies should find a place in the Pharmacopœia and many of the older ones should be dropped. Mr. A. G. Vogeler urged that pharmacists should not clamor for standardization, but should wait until the physicians should demand it and then make the best of the situation. Prof. C. S. N. Hallberg said that before standardization could be made effective therapeutists must be able to say which of the constituents of the drug represent its medicinal value. The effect of drugs upon the lower animals might indicate the effect upon human beings, but was not so nearly identical with this effect as to serve for purposes of standardization. Nor were different individuals affected in the same way by the same drug, nor was the same individual so affected under different conditions. Messrs. T. V. Wooten, L. I. Schreiner, Bruno Batt and P. F. A. Rudnick also participated in the discussion.

The third of the series of meetings of the Alumni Association of the Chicago College of Pharmacy for the discussion of pharmacopœial revision was held at the Palmer House, Chicago, on the evening of March 7th.

The topic for discussion was "The Introduction of Protected Medicines into the Pharmacopœia." Mr. A. G. Vogeler, editor of the *Western Druggist*, presented a paper. Mr. Vogeler introduced the subject by referring to the resolution passed by the A. Ph. A. in 1889 in favor of the admission of important medicinal chemicals, even if prepared by patented processes, providing that only those of established worth be so admitted. And to a similar resolution adopted by the American Medical Association at the Columbus meeting, the sense of this resolution being that admittance to the Pharmacopœia should be granted to synthetical chemical products of definite and known chemical structure without regard to patents.

The speaker stated that the principal points that had been made against the

introduction of such medicines were these: (1) That it is unethical to use a medicine of unknown composition or the manufacture of which is controlled by a monopoly, especially as such monopoly often means an exorbitant cost to the patient. (2) Patented processes exclude the improvement in methods of manufacture of a medicine, copyrighting the name bestows perpetual monopoly, and the manufacturer may control the medicine, without regard to standard, varying its composition as he sees fit. (3) Introduction of these remedies under their trade-marked names would unduly advertise certain manufactures. These arguments the speaker then proceeded to refute. The physician is in duty bound to prescribe what his experience has led him to believe is best for the patient, regardless of ethics. Whatever the physician prescribes, unless obviously endangering the life of the patient, the pharmacist must dispense. Again, the inventor is entitled to the fruits of his labor, and protection should be extended to him. This is universally conceded concerning mechanical inventions; why does it not apply as well to the results of the chemist's researches? The Revision Committee may safely be entrusted with the duty of admitting only worthy products of this kind. He then read a large number of expressions from prominent physicians and pharmacists favoring the admission of protected remedies, the chief argument used being the advantages of having a definite standard of purity and strength of these medicines and of obtaining disinterested and authoritative information concerning them. In conclusion, the speaker stated that it seemed altogether likely that a number of the new synthetics will be recognized in the next Pharmacopœia regardless of any consideration of patents or copyrights. The pharmacist can only ask of a drug that its identity, strength and purity can be definitely fixed and controlled.

Dr. D. R. Brower, Professor of Mental Diseases, Materia Medica and Therapeutics and delegate to the Convention from Rush Medical College, opened the discussion. The doctor said that he would greatly regret the admission to the Pharmacopœia of those patented remedies which physicians are using without excuse. Such admission would be greatly to the injury of the Pharmacopœia.

Mr. A. E. Ebert asked "For whom is the Pharmacopœia created? Is it for medicine and pharmacy or for the manufacturers?" He was opposed to the admission of such remedies, especially with our present faulty trade-mark laws.

Dr. J. A. Patton expressed himself that physicians are responsible for the immense number of these patent remedies that are in use, and in his opinion the great majority of these new synthetics serve no useful purpose and could be well supplanted by official remedies. The fault rests largely with the medical colleges, most of which have, in the past, given inferior instruction in materia medica, resulting in the student neglecting this important study, and consequently after graduation depending largely upon the advertisements of the manufacturer for his remedies.

Dr. H. H. Rogers also expressed himself as opposed to the proposition.

Prof. C. S. N. Hallberg pointed out the distinctions between medicines made by patented processes, those in which the substance itself is patented and articles possessing copyrighted or trade-marked names. No preparation controlled by a copyrighted name should be placed in the Pharmacopœia, but substances the process of manufacture of which is alone patented might well be admitted. He cited the case of salicylic acid, prepared by Kolbe's

process, and thus protected at the time of its admission, as an example. The debatable ground, he said, concerned those substances which in themselves were patented, and to the admission of these he was decidedly opposed.

THE PHILADELPHIA COLLEGE OF PHARMACY.

The following is a copy of the questions given to the first and second year classes at their recent examination. Those in operative pharmacy, practical botany, pharmacognosy and analytical chemistry were conducted in the respective laboratories; the others were written.

FIRST YEAR EXAMINATION.

THEORY AND PRACTICE OF PHARMACY.

A—(1) What is a fluid extract? (2) Give the typical formula for an official fluid extract. (3) What is meant by a fluid extract made by percolation with incomplete exhaustion? (4) Describe continuous percolation and illustrate Beck's process by a sketch or detailed description.

B—(1) What is meant by vacuum percolation? What are the uses of vacuum evaporation? (3) What mechanical methods are employed in applying a vacuum to evaporation? (4) Name three examples of products used in pharmacy, or the arts, in the manufacture of which a vacuum pan is employed, and give reasons for using it in each case.

CHEMISTRY.

C—(1) Describe the element Chlorine, and write a reaction for its production. (2) What are the chief uses of Chlorine in the arts, and in what forms or preparations is it mainly taken for such utilization? (3) Give the formula for its Hydrogen Compound, and write a reaction for its production. (4) What are the compounds of Chlorine and the metals called? Give examples, naming official compounds. (5) Give the list of compounds of Chlorine and Oxygen, with names and formulas.

D—(1) Describe the occurrence of the element Carbon in nature. (2) Name the official forms of Carbon, and state the uses of each. (3) Mention the several Oxides of Carbon, and describe each. (4) What is the formula of Carbonic Acid, and how is it made? (5) Give the formula of a neutral carbonate, an acid carbonate and a basic carbonate.

PHYSIOLOGY.

E—Digestion.—(1) Name the digestive ferments which act upon the following, viz., bread, butter and meat. (2) State where these ferments are secreted, and the changes which take place in these foods to render them fit for absorption. *The Blood.*—(3) State briefly the route of the circulation of the blood. (4) What ratio do the beats of the heart bear to each respiration? *The Urine.*—(5) What is its normal specific gravity, reaction, quantity, color and odor? (6) Name briefly its route from the blood to the bladder. *The Nervous System.*—(7) Of what two kinds of matter is nerve tissue composed? (8) In case of contact of a finger with a hot iron, what action will take place, and why? State briefly the functions of the cerebellum and cerebrum.

BOTANY.

F—(1) What is the proper time, generally speaking, for the collection of each of the following for medicinal purposes: roots, rhizomes, leaves, flowers, fruits and seeds? State your reasons. (2) By what means may vegetable drugs be preserved from the attacks of insects? (3) What is an albumenous seed, and explain what is meant by albumen. (4) What is a composite flower? Give a drug example and indicate by means of a diagram the different parts of such a flower. (5) Explain all the steps you would take in making an examination of a powdered drug, first for identification and then for purity.

COMMITTEE.

G—(1) Describe Oxygen. (2) Give its symbol, atomic weight and valence. (3) In what form does it chiefly occur in nature? In commerce? (4) How may Oxygen be prepared? (5) What is Hydrogen Peroxide? (6) Give the percentage of Oxygen required by the U.S.P. for this compound. (7) For what purpose is it used in the arts? In medicine?

H—(1) Express in figures the following metric weights, and take their sum: Three and one-half kilogrammes, fifty-four grammes, ninety-five centigrammes, eight hundred and five milligrammes. (2) How many grammes of diluted Acetic Acid (6 per cent.) may be made from 3 kilogrammes of 80 per cent. Acetic Acid? (3) If a proprietary article selling at $1 yields a profit of 33⅓ per cent., what would it cost and what percentage of profit would be secured if it were sold at a "cut rate" of 80 cents?

I—(1) What are medicated waters? (2) How are they usually prepared? (3) What is the advantage of using steam in preparing some of them? (4) For what purpose are they usually employed in preparations? (5) Name five official waters, giving official and English names.

K—(1) Write a brief account (ten or twenty lines) of the uses of Acetic Acid as a menstruum, describing its advantages and its limitations. (2) For what classes of galenical preparations is it best fitted?

OPERATIVE PHARMACY.

(1) *Specific Gravity.*

Determine the specific gravity of the liquid in the bottle labelled "specific gravity liquid;" put all calculations on the sheet of paper, with your name and examination number.

(2) *Granulated Salt.*

Ammonium Chloride	20	gm.

Purify, granulate, and put in a wide-mouth bottle.

(3) *Mass of Mercury.*

Mercury	6·6	gm.
Powd. Glycyrrhiza	1·	gm.
Powd. Althæa	5·	gm.
Honey of Rose	5·	c.c.
Glycerin	10	drops

Put in a walnut box.

PRACTICAL BOTANY.

(1) Identify the specimens in the mixture of drugs, giving their pharmacopœial names.

(2) Identify three powders and give your opinion as to their purity.

(3) Make sections of the drug and state whether it is a root or rhizome, monocotyledon or dicotyledon, and make a diagram indicating the kinds of tissues and their cell contents.

SECOND YEAR EXAMINATION.

THEORY AND PRACTICE OF PHARMACY.

A—Mercury.—(1) Give the unabbreviated official names of five preparations of the U. S. Pharmacopœia, each containing Mercury in the metallic state. (2) Why are the words "Corrosivum," "Mite," "Flavum," "Rubrum" used in the official titles of Mercurial Salts instead of the chemical names? (3) How is Red Mercuric Iodide made? (4) Why is it necessary to use the exact quantities prescribed by the formula? (5) How is Yellow Mercurous Iodide made? (6) What was the official name of this salt in the U.S.P., 1880? (7) To what is the variation in color of this compound due?

B—Cotton.—(1) Under what title is cotton wool official? (2) How is absorbent cotton made? (3) In what respect does raw cotton differ from absorbent cotton? (4) Describe a good test for absorbent cotton. (5) What action has Sulphuric Acid mixed with water (2 to 1) upon Cellulose? (6) How is Pyroxylin made? (7) What are the uses of Pyroxylin?

C—Acacia.—(1) What is the chemical composition of Acacia? (2) What is its solubility in water? (3) In alcohol? (4) Describe the best process for making official mucilage of Acacia. (5) In dispensing, why is granulated Acacia often to be preferred to finely powdered Acacia? (6) What action have the following upon a solution of Acacia: Neutral Lead Acetate, Basic Lead Acetate, Sodium Silicate, Sodium Borate, Ferric Chloride?

D—Acid Saccharine Fruits.—(1) What acids are usually found in these fruits? (2) Describe the action of the natural ferment found in fruits upon the pulpy constituents. (3) What is pectose, and pectin? (4) Why does the rapid application of strong heat prevent the gelatinization of fruit juices? (5) Describe an effective process of preserving fruit juices without the use of chemicals.

E—Sinapisms.—(1) What two kinds of mustard seed are official? (2) Name the constituents of each. (3) Describe the action of the constituents in producing pungency in the mustard used in making "Charta Sinapis, U.S.P." (4) Give the official process for making "mustard paper." (5) Why is it necessary to protect the finished preparation from the action of moisture in the air? (6) Why is tepid water preferred to hot water in mixing a mustard plaster?

CHEMISTRY.

F—(1) Describe the occurrence of salt, and state how it is extracted from the crude native material. (2) For what important industries does salt serve as the starting point? Mention some of the products of these industries. (3) Write the formulas of Sodii Chloridum, Sodii Chloras, Sodii Bisulphis, Sodii Hyposulphis, Sodii Phosphas, Sodii Hypophosphis, Sodii Boras, and Sodii Carbonas.

G—(1) To what group of metals does Calcium belong? (2) Describe Calx Chlorata; give an account of its preparation, and state its pharmaceutical and technical uses. (3) What is the formula of Calcium Carbide? How is it formed and what is it used for? Write the reaction for its decomposition by water.

H—(1) Describe the appearance of the metal Copper, and give its physical properties. Mention its most important ores, stating their composition. (2) Mention the important alloys of Copper. (3) Enumerate the analytical tests by which Copper salts or solutions can be identified.

I—(1) Mention the most important forms of Carbon, both natural and artificial. State how the latter are produced. (2) Describe the official varieties of Carbon, and state their uses in the arts. (3) What are the chemical differences between "coal gas" and "water gas?" How is the latter made?

K—(1) Describe the metal Lead and state how it is obtained. (2) Give the formulas for the most important official salts of this metal. (3) What is "white lead," "red lead," litharge, "sugar of lead?" (4) In what other pigments, if any, is lead contained?

MATERIA MEDICA.

L—Solanaceæ.—(1) Give the official name, botanical origins, habitats and constituents of three mydriatic leaf drugs obtained from this order. (2) Define the term mydriatic, and state the action of such a drug. (3) Give official names and doses of the salts of three mydriatic alkaloids.

M—Strychnine.—(1) Give the botanical origins and habitats of the seeds yielding this alkaloid. (2) From what source is it obtained commercially? (3) Give the maximum dose. (4) State briefly its action upon the gastro-intestinal tract, the spinal cord, the circulation and the respiration.

N—Rubiaceæ.—(1) Name an emetic root derived from this order and the alkaloid which it contains. (2) Name a febrifuge bark yielded by this order. (3) Under what names is it official and what are the pharmacopœial requirements regarding its constituents? (4) State its habitat, the countries where it is now cultivated and the manner of collection of the cultivated barks. (5) Name the four principal alkaloids yielded by it and state the ratio of their efficiency as antiperiodics.

O—Coca.—(1) State the botanical origin, habitat and natural order. (2) Name the two varieties and state which is preferred. (3) What is the action of this drug and how is it used by the South American Indians? (4) Name its principal alkaloid and the amount present in the dried leaves and in the fresh leaves. (5) What action has this alkaloid upon the pupil of the eye and upon the sensory nerves? (6) What quantity is a safe dose? (7) Name the similar synthetic alkaloids that are in use.

P—Botanical Names.—Give the botanical names of the plants yielding the following, viz.: (1) Nicotine. (2) Quebrachamine. (3) Narcotine. (4) Eserine. (5) Veratrine. (6) Sparteine. (7) Salicin. (8) Lupulin. (9) Digitoxin. (10) Methyl Salicylate.

PHARMACOGNOSY.

(1) Identify fifty of the specimens in the mixture of drugs, giving their pharmacopœial names.

(2) Identify five of the powders; give your opinion as to their purity and state all your reasons.

(3) Give the names of the sediments in the specimen of urine and draw the characteristics.

ANALYTICAL CHEMISTRY.

This included the qualitative analysis of urine for abnormal constituents and the examination, for basic and acid constituents, of pure and adulterated pharmacopœial powders.

SPECIMENS FOR RECOGNITION.

(1) Aqua Fœniculi. (2) Linimentum Chloroformi. (3) Extractum Senna Fluidum. (4) Syrupus Ferri Iodidi. (5) Tinctura Gentiana Composita. (6) Ammonii Carbonas. (7) Alumen. (8) Magnesii Carbonas. (9) Ferri Sulphas. (10) Aqua Chlori. (11) Aconitum. (12) Rhamnus Purshiana. (13) Belladonna Folia. (14) Marrubium. (15) Santonica.

MINUTES OF SPECIAL MEETING.

A special meeting of the members of the Philadelphia College of Pharmacy was held at the College on Friday, March 23, 1900, at 10 o'clock A.M., to take action upon the decease of the President, Charles Bullock, who died on the evening of March 21st. Mr. Wm. J. Jenks presided.

Remarks were made by Messrs. Jenks, Shinn, Ellis, Beringer, Sadtler, Remington, England, Ross and Krewson, who expressed their high regard and appreciation of the personal character, scientific attainments, consistent devotion to the best interests of the College, the valuable research work performed in the advancement of pharmacy, the many years of persistent, unobtrusive, self-sacrificing services rendered, and their deep sense of the great loss the College has sustained in the death of its President.

Mr. Bullock graduated from this College in 1847, and served it faithfully for many years as Trustee, Secretary, Vice-President and President, and was the first President who died while holding office.

Professor Remington offered the following resolutions, which were adopted, ordered to be spread upon the minutes, and an engrossed copy presented to the family:

"WHEREAS, The inscrutable wisdom of an all-wise Providence has caused the Philadelphia College of Pharmacy to mourn the loss of its beloved President, Charles Bullock, who passed away from this life on March 21, 1900, in the fulness of years and usefulness;

"*Resolved*, That, while we bow in submission to this dispensation, we desire to express our deep sense of the great loss which has fallen upon us by the death of our President, who has left behind him an enduring record of labor and self-sacrifice in the discharge of his various duties, whether as student, graduate, trustee, secretary, vice-president or president. Pharmaceutical literature has been enriched by his scientific researches, and the full value of his wise and faithful service, extending over a period of fifty-three years, while

testifying to his love and zeal in laboring for the education and advancement of the younger members of our profession, can never be fully realized by the present membership of this College.

"*Resolved*, That this College will always hold in grateful remembrance the persistent labors of our deceased President, and endeavor to emulate his example; the unobtrusive, consistent, conscientious effort to fulfil all of his duties will ever be an incentive to his colleagues, who deplore most deeply his removal from our midst.

"*Resolved*, That we tender to his family our sincere sympathy in their sorrow, and that a copy of these resolutions be forwarded to them, and also be placed permanently upon the records of the Philadelphia College of Pharmacy, as a memorial of the high esteem and affectionate regard in which he was universally held by all of its members."

It was ordered that the Committee on Deceased Members, with Mr. Beringer added to it, prepare a memorial for publication in the AMERICAN JOURNAL OF PHARMACY.

It was also ordered that the engrossed resolutions be signed by the officers of the Board of Trustees, as well as by the officers of the College.

On motion, the meeting adjourned.

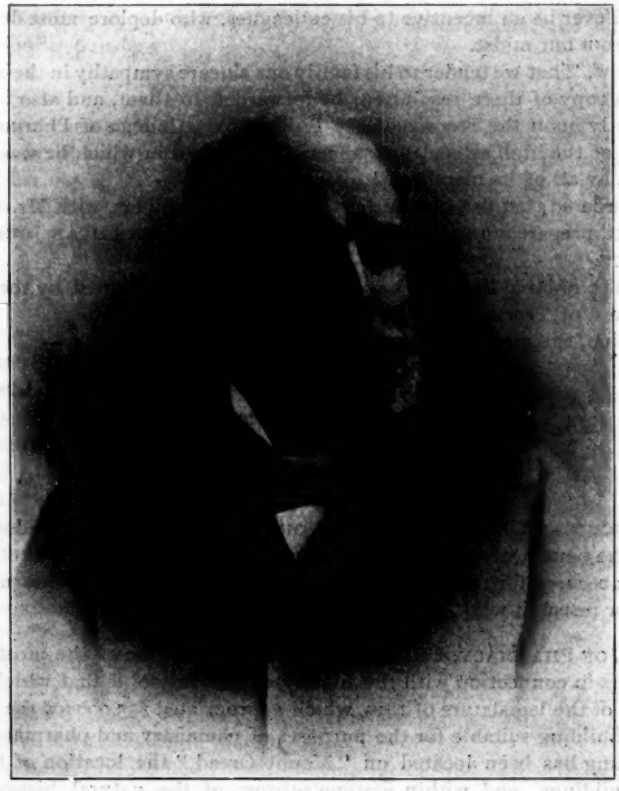
W. NELSON STEM,
Secretary.

VARIETIES.

THE MICHIGAN UNIVERSITY SCHOOL OF PHARMACY is about to adopt a new plan for the benefit of its classes in pharmacognosy. Several acres of ground have been secured for the purpose of growing all medicinal plants necessary for class or research work.

SCHOOL OF PHARMACY, UNIVERSITY OF KANSAS.—One of the most important matters in connection with the history of this school is that which relates to the act of the legislature of 1899, which appropriated $55,000 for the erection of a new building suitable for the purposes of chemistry and pharmacy. This new building has been located on "Mount Oread," the location of the University buildings, and within a stone's-throw of the natural history building. The foundation rests upon solid rock. The money which has been used for the structure has been put mainly into walls, and such equipment as will furnish each room, wherever desired, water, gas, compressed air, exhausts, high-pressure steam, and all of the appliances for the latest equipment of such buildings. The equipment of the rooms with lecture tables, etc., is an added expense which is to be provided for outside the $55,000. The new quarters will furnish to the pharmacy school an important addition to what it now has, namely, a room especially devoted to the art of dispensing, where every student will be required to take up this subject in a practical way under proper instruction. A special laboratory for pharmacognosy, in connection with a museum for the display of crude drugs, will be another feature of the new building. In this room, it is to be hoped, there will be some inspiration for original work by advanced students.

HOWARD B. FRENCH, Second Vice-President of the Philadelphia College of Pharmacy, was unanimously chosen President of the College at the annual meeting held March 26, 1900. He succeeds the late Mr. Charles Bullock, who had been President of the College since 1885.



HOWARD BARCLAY FRENCH.

Mr. French was born in Salem, O., September 3, 1848, and when but four years of age, his parents removed to Philadelphia. His early education was received in the school of the Society of Friends. He learned the drug business while apprenticed to the late William B. Webb, a prominent pharmacist of this city, and who was for many years a Treasurer of this College. Mr. French graduated from the Philadelphia College of Pharmacy in 1871, and soon thereafter became a member. He has been for many years active as Chairman of the Property Committee of the College, and in this capacity superintended the erection of the new building. In 1897 he was elected Second Vice-President by reason of the death of Mr. Robert Shoemaker.